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EXAMINER	
SHARON, AYAL I	
ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/632,522	Applicant(s) PAPAEFSTATHIOU, EFSTATHIOS	
	Examiner Ayal I Sharon	Art Unit 2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 August 2000*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 2.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Introduction

1. Claims 1-31 of U.S. Application 09/632,522 filed on 08/04/2000 are presented for examination. This application claims priority benefit of provisional application 60/209,759, filed on 06/06/2000.

Claim Interpretations

2. “Bandwidth” is defined as follows in “The Art of Computer Systems Performance Analysis” by Raj Jain (pp.38-39):

> The maximum achievable throughput under ideal workload conditions is called **nominal capacity** of the system. For computer networks, the nominal capacity is called the **bandwidth** and is usually expressed in bits per second.

The Jain reference was submitted by the applicants in an IDS (paper #2).

3. “Contention” is defined as follows in “Performance Engineering of Software Systems” by Connie Smith (p.37):

> The computer system on which the software executes can be viewed as a simple model, as shown in Figure 2.2. Its **performance depends on the following model characteristics** [LAZ84a, SAU81]:
>
> - The *arrival rate* of each *type of job*
> - The computer system *resource requirements* of each type of job
> - The contention delays that result from the *interaction with other jobs* in the system
> - The *scheduling policies* used to determine which waiting job next obtains the needed system resource

The Smith reference was submitted by the applicants in an IDS (paper #2).

4. "Event Horizon" is defined by the Applicant in the specification (p.18, lines18-21) as follows:

> The event with the shortest duration to completion or creation determines the event horizon (EH). The event horizon defines the duration of the next steady state of the system. For this period the network traffic remains steady.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. The prior art used for these rejections is as follows:

7. Smith, C. Performance Engineering of Software Systems. Addison-Wesley Publishing. ISBN 0-201-53769-9. © 1990. ("**Smith**").

8. The claim rejections are hereby summarized for Applicant's convenience. The detailed rejections follow.

9. **Claims 1-5, 8, 11-15, 18, 21-25, 28, and 31 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Smith.**

10. In regards to Claim 1, Smith teaches the following limitations:

1. A method for generating a delay model in a networked system under a defined workload, the method comprising:
(Smith, especially: pp.28, and 225-228)

p.28 teaches that "The software execution model must represent … contention for resources."

pp.227-228 teach that "Let us examine the sources of contention for resources in a computer system: ... The system execution model can characterize the delays due to each of these sources of contention."

generating, for a first active message, a routing structure based upon a network configuration and a source and destination of the active message;
(Smith, especially: p.233 and Fig.5.4)

p.233 teaches that "Figure 5.4 shows a simple queueing network model (QNM) of a computer system."

creating a contention structure created by summing together routing structure elements for active message events;
(Smith, especially pp.317-320 and pp.328-332)

p.317 teaches that "The next analysis step selects viable alternatives and uses them in the system execution models to assess the impact of contention delays on response time, and the sensitivity to various parameters." Therefore the routing structure is used as the basis for contention structures.

In regards to summing together elements, the equation on p.318, in Table 6.5, shows that Avg. time to process a request (w1) for users corresponds to a summing the number of visits by users (where number of users is a routing structure element).

p.328 teaches that "The granularity of events varies from initiation and completion of jobs, programs, or subroutines, or actions within subroutines."

first calculating, for the first active message, an available bandwidth for use by the message at a path between network nodes utilized by the active message,
(Smith, especially: pp.228-230, p.252)

According to the definition in Jain, bandwidth corresponds to capacity. Utilization and Throughput, as taught in Smith (pp.229, 230), are measurements directly related to capacity.

the available bandwidth being a function of a level of contention between the first active message and at least a second active message on the path,
(Smith, especially: pp.235-236, Figs.5.2 and Fig.5.3)

Smith teaches in Fig.5.3 "Performance metrics when Number of Users Doubles". Doubling the number of users corresponds to doubling the number of messages.

the level of contention being determined in accordance with the contention structure and the routing structure for the first active message; and
(Smith, especially: pp.227-236, Figs.5.2 and Fig.5.3)

The level of contention is reflected in the performance metrics.

second calculating, for the first active message, based upon the available bandwidth, a modeled communication delay to communicate at least a portion of the first active message.
(Smith, especially: pp.227-236, Figs.5.2 and Fig.5.3)

The "system response time" in Fig.5.2 and 5.3 corresponds to the modeled communication delay.

11. In regards to Claim 2, Smith teaches the following limitations:

2. The method of claim 1 further comprising:
rendering a set of delay values corresponding to a set of active events; and
(Smith, especially: pp.227-236, Figs.5.2 and Fig.5.3)

The "system response time" in Fig.5.2 and 5.3 corresponds to the modeled communication delay.

identifying an event horizon corresponding to a simulated time duration before an event state change.
(Smith, especially: pp.328-329)

Smith teaches (p.329) that "Similarly, the sampling interval for monitors must be short enough to detect the states of interest, but not to short; otherwise the amount of data collected (thus the measurement overhead) is much greater than necessary."

12. In regards to Claim 3, Smith teaches the following limitations:

3. The method of claim 2 further comprising:
advancing a simulation clock based upon the event horizon; and
(Smith, especially: pp.328-329)

Smith teaches (p.329) that "For example, the granularity of events must match the resolution of the system clock used to time them. The events should not be too short compared to the clock's time units … Similarly, the sampling interval for monitors must be short enough to detect the states of interest, but not to short; otherwise the amount of data collected (thus the measurement overhead) is much greater than necessary."

third calculating completed portions of each one of the set of active events based upon the event horizon.
(Smith, especially: pp.328-329)

Smith teaches (p.329) that "For example, the granularity of events must match the resolution of the system clock used to time them. The events should not be too short compared to the clock's time units ... Similarly, the sampling interval for monitors must be short enough to detect the states of interest, but not to short; otherwise the amount of data collected (thus the measurement overhead) is much greater than necessary."

13. In regards to Claim 4, Smith teaches the following limitations:

4. The method of claim 3 wherein the event state change corresponds to a message event state change, and further comprising the steps of

fourth calculating an updated contention structure in accordance with the message event state change and a present set of active message events after the advancing step;
(Smith, especially pp.317-320)

p.317 teaches that "The next analysis step selects viable alternatives and uses them in the system execution models to assess the impact of contention delays on response time, and the sensitivity to various parameters." Therefore the routing structure is used as the basis for contention structures.

Figs.6.6, 6.7, and 6.8 show "revised execution models" for varying numbers of users.

rendering a new set of delay values corresponding to the present set of active events in accordance with the updated contention structure and remaining portions of the present set of active events; and
(Smith, especially pp.317-320)

Figs.6.6 shows "response time" for varying numbers of users.

determining a next event horizon in accordance with the new set of delay values.
(Smith, especially: pp.328-329)

Smith teaches (p.329) that "For example, the granularity of events must match the resolution of the system clock used to time them. The events should not be too short compared to the clock's time units ... Similarly, the sampling interval for monitors must be short enough to detect the states of interest, but not to short; otherwise the amount of data collected (thus the measurement overhead) is much greater than necessary."

14. In regards to Claim 5, Smith teaches the following limitations:

5. The method of claim 2 wherein the event state change corresponds to a completed active event, and further comprising the step of recording within an output trace record an entry corresponding to the completed active event.
(Smith, especially: pp.248-261)

Smith's derivation of "mean service times" (p.252) corresponds to a "trace".

15. In regards to Claim 8, Smith teaches the following limitations:

8. The method of claim 1 further comprising generating a statistical summary of completed events based upon simulated time durations.
(Smith, especially: p.328-329, Tables 5.2 and 5.7)

Smith's tables, for example 5.2 and 5.7, correspond to statistical summaries of completed events.

16. In regards to Claim 11, Smith teaches the following limitations:

11. A computer system including executable program code for generating a delay model in a networked system under a defined workload, the computer system comprising:

an input stage that receives a workload description and renders event sequences corresponding to the workload description; and
(Smith, especially: pp.248-252)

Smith's derivation of "mean service times" (p.252) corresponds to an "event sequence".

an evaluation stage that receives the event sequences and renders timing information representing execution of the event sequences in a distributed processing network configuration, the evaluation stage comprising executable program instructions for:
(Smith, especially: pp.255-256)

generating, for a first active message, a routing structure based upon a network configuration and a source and destination of the active message;
(Smith, especially: p.233 and Fig.5.4)

p.233 teaches that "Figure 5.4 shows a simple queueing network model (QNM) of a computer system."

creating a contention structure created by summing together routing structure elements for active message events;
(Smith, especially pp.317-320 and pp.328-332)

p.317 teaches that "The next analysis step selects viable alternatives and uses them in the system execution models to assess the impact of contention delays on response time, and the sensitivity to various parameters." Therefore the routing structure is used as the basis for contention structures.

In regards to summing together elements, the equation on p.318, in Table 6.5, shows that Avg. time to process a request (w1) for users corresponds to a

summing the number of visits by users (where number of users is a routing structure element).

p.328 teaches that "The granularity of events varies from initiation and completion of jobs, programs, or subroutines, or actions within subroutines."

first calculating, for the first active message, an available bandwidth for use by the message at a path between network nodes utilized by the active message,
(Smith, especially: pp.228-230, p.252)

According to the definition in Jain, bandwidth corresponds to capacity. Utilization and Throughput, as taught in Smith (pp.229, 230), are measurements directly related to capacity.

the available bandwidth being a function of a level of contention between the first active message and at least a second active message on the path,
(Smith, especially: pp.235-236, Figs.5.2 and Fig.5.3)

Smith teaches in Fig.5.3 "Performance metrics when Number of Users Doubles". Doubling the number of users corresponds to doubling the number of messages.

the level of contention being determined in accordance with the contention structure and the routing structure for the first active message; and
(Smith, especially: pp.227-236, Figs.5.2 and Fig.5.3)

The level of contention is reflected in the performance metrics.

second calculating, for the first active message, based upon the available bandwidth, a modeled communication delay to communicate at least a portion of the first active message.
(Smith, especially: pp.227-236, Figs.5.2 and Fig.5.3)

The "system response time" in Fig.5.2 and 5.3 corresponds to the modeled communication delay.

17. **Claims 12-15 and 18 are rejected based on the same reasoning as claims 2-5 and 8, *supra*. Claims 12-15 and 18 are computer system claims reciting the equivalent limitations as are recited in method claims 2-5 and 8, and taught throughout Smith.**

18. In regards to Claim 21, Smith teaches the following limitations:

21. A computer-readable medium having computer executable instructions for

performing a set of steps to generate a delay model in a networked system under a defined workload, the steps including:

generating, for a first active message, a routing structure based upon a network configuration and a source and destination of the active message;
(Smith, especially: p.233 and Fig.5.4)

p.233 teaches that "Figure 5.4 shows a simple queueing network model (QNM) of a computer system."

creating a contention structure created by summing together routing structure elements for active message events;
(Smith, especially pp.317-320 and pp.328-332)

p.317 teaches that "The next analysis step selects viable alternatives and uses them in the system execution models to assess the impact of contention delays on response time, and the sensitivity to various parameters." Therefore the routing structure is used as the basis for contention structures.

In regards to summing together elements, the equation on p.318, in Table 6.5, shows that Avg. time to process a request (w1) for users corresponds to a summing the number of visits by users (where number of users is a routing structure element).

p.328 teaches that "The granularity of events varies from initiation and completion of jobs, programs, or subroutines, or actions within subroutines."

first calculating, for the first active message, an available bandwidth for use by the message at a path between network nodes utilized by the active message,
(Smith, especially: pp.228-230, p.252)

According to the definition in Jain, bandwidth corresponds to capacity. Utilization and Throughput, as taught in Smith (pp.229, 230), are measurements directly related to capacity.

the available bandwidth being a function of a level of contention between the first active message and at least a second active message on the path,
(Smith, especially: pp.235-236, Figs.5.2 and Fig.5.3)

Smith teaches in Fig.5.3 "Performance metrics when Number of Users Doubles". Doubling the number of users corresponds to doubling the number of messages.

the level of contention being determined in accordance with the contention structure and the routing structure for the first active message; and
(Smith, especially: pp.227-236, Figs.5.2 and Fig.5.3)

The level of contention is reflected in the performance metrics.

second calculating, for the first active message, based upon the available bandwidth, a modeled communication delay to communicate at least a portion of the first active message.
(Smith, especially: pp.227-236, Figs.5.2 and Fig.5.3)

The "system response time" in Fig.5.2 and 5.3 corresponds to the modeled communication delay.

19. **Claims 22-25 and 28 are rejected based on the same reasoning as claims 2-5 and 8, *supra*. Claims 22-25 and 28 are computer-readable medium claims reciting the equivalent limitations as are recited in method claims 2-5 and 8, and taught throughout Smith.**

20. In regards to Claim 31, Smith teaches the following limitations:

31. A computer system including executable program code for generating a delay model in a networked system under a defined workload, the computer system comprising:
an input stage that receives a workload description and renders event sequences corresponding to the workload description; and
(Smith, especially: pp.248-252)

an evaluation stage that receives the event sequences and renders timing information representing execution of the event sequences in a distributed processing network configuration, the evaluation stage comprising:
(Smith, especially: pp.255-256)

a routing structure generator for generating, for a first active message, a routing structure based upon a network configuration and a source and destination of the first active message;
(Smith, especially: p.233 and Fig.5.4)

p.233 teaches that "Figure 5.4 shows a simple queueing network model (QNM) of a computer system."

a contention structure generator for creating a contention structure by summing together routing structure elements for active message events;
(Smith, especially pp.317-320 and pp.328-332)

p.317 teaches that "The next analysis step selects viable alternatives and uses them in the system execution models to assess the impact of contention delays on response time, and the sensitivity to various

parameters." Therefore the routing structure is used as the basis for contention structures.

In regards to summing together elements, the equation on p.318, in Table 6.5, shows that Avg. time to process a request (w1) for users corresponds to a summing the number of visits by users (where number of users is a routing structure element).

p.328 teaches that "The granularity of events varies from initiation and completion of jobs, programs, or subroutines, or actions within subroutines."

a bandwidth availability calculator for first calculating, for the first active message, an available bandwidth for use by the message at a path between network nodes utilized by the first active message,
(Smith, especially: pp.228-230, p.252)

According to the definition in Jain, bandwidth corresponds to capacity. Utilization and Throughput, as taught in Smith (pp.229, 230), are measurements directly related to capacity.

the available bandwidth being a function of a level of contention between the first active message and
(Smith, especially: pp.235-236, Figs.5.2 and Fig.5.3)

Smith teaches in Fig.5.3 "Performance metrics when Number of Users Doubles". Doubling the number of users corresponds to doubling the number of messages.

and at least a second active message on the path, the level of contention being determined in accordance with the contention structure and the routing structure for the first active message; and
(Smith, especially: pp.227-236, Figs.5.2 and Fig.5.3)

The level of contention is reflected in the performance metrics.

a delay calculator for second calculating, for the first active message, based upon the available bandwidth, a modeled communication delay to communicate at least a portion of the first active message.
(Smith, especially: pp.227-236, Figs.5.2 and Fig.5.3)

The "system response time" in Fig.5.2 and 5.3 corresponds to the modeled communication delay.

Claim Rejections - 35 USC § 103

21. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

22. The prior art used for these rejections is as follows:

23. Smith, C. Performance Engineering of Software Systems. Addison-Wesley Publishing. ISBN 0-201-53769-9. © 1990. ("**Smith**").

24. Anderson, A. "The Routing Table." http://www.tldp.org/LDP/nag/node31.html. Last updated: March 7, 1996. Printed on March 8, 2004. ("**Routing Table**")

25. Kerbyson et al. "Is Predictive Tracing Too Late for HPC Users?" High Performance Computing, Plenum Press, 1998. ("**Kerbyson**")

26. Claims 6-7, 16-17, and 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith in view of Routing Table.

27. In regards to Claim 6, Smith does not expressly teach the following limitations:

6. The method of claim 1 wherein the routing structure comprises an array.

"Routing Table", on the other hand, teaches that the IP protocol uses a Routing Table, which is represented as an array, for listing network connections.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to represent a network structure as an array, because the the standard way that networks are represented.

28. In regards to Claim 7, Smith does not expressly teach the following limitations:

7.The method of claim 1 wherein the contention structure comprises an array.

"Routing Table", on the other hand, teaches that the IP protocol uses a Routing Table, which is represented as an array, for listing network connections.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to represent a network structure as an array, because the the standard way that networks are represented.

29. **Claims 16-17 and 26-27 are rejected based on the same reasoning as claims 6-7, *supra*. Claims 16-17 are computer system claims reciting the equivalent limitations as are recited in method claims 6-7 and taught throughout Smith. Claims 26-27 are computer-readable medium claims reciting the equivalent limitations as are recited in method claims 6-7 and taught throughout Smith.**

30. **Claims 9-10, 19-20, and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith in view of Routing Table.**

31. In regards to Claim 9, Smith does not expressly teach the following limitations:

9. The method of claim 1 further comprising the step of processing an input trace sequence to render a set of events including the first active message.

Kerbyson, on the other hand, does expressly teach the use of Execution and Predictive Traces. (See Figure 1, p.3)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Smith with those of Kerbyson, because by doing so, "... predicted application execution can be viewed and examined within monitoring tools, already familiar to users, in order to identify performance hot-spots before system use." (Kerbyson, pp.1-2)

32. In regards to Claim 10, Smith does not expressly teach the following limitations:

> 10. The method of claim 9 wherein the input trace sequence is rendered by a translator of a workload definition.

Kerbyson, on the other hand, does expressly teach the use of Execution and Predictive Traces. (See Figure 1, p.3)

Kerybyson also teaches that the trace sequence is rendered by a compilation of a CHIP3S Script (See Figure 2 and the paragraph immediately below the figure).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Smith with those of Kerbyson, because by doing so, "... predicted application execution can be viewed and examined within monitoring tools, already familiar to users, in order to identify performance hot-spots before system use." (Kerbyson, pp.1-2)

33. Claims 19-20 and 29-30 are rejected based on the same reasoning as claims 9-10, *supra*. Claims 19-20 are computer system claims reciting the equivalent limitations as are recited in method claims 9-10 and taught throughout Smith. Claims 29-30 are computer-readable medium claims reciting the equivalent limitations as are recited in method claims 9-10 and taught throughout Smith.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ayal I. Sharon whose telephone number is (703) 306-0297. The examiner can normally be reached on Monday through Thursday, and the first Friday of a biweek, 8:30 am – 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Teska can be reached on (703) 305-9704. Any response to this office action should be mailed to:

Director of Patents and Trademarks
Washington, DC 20231

Hand-delivered responses should be brought to the following office:

4th floor receptionist's office
Crystal Park 2
2121 Crystal Drive
Arlington, VA

The fax phone number is: (703) 872-9306

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist, whose telephone number is: (703) 305-3900.

Ayal I. Sharon

Art Unit 2123

March 5, 2004

KEVIN J. TESKA
SUPERVISORY
PATENT EXAMINER